SBN Progress – April 2018

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I. Testing the SBND PDS in CAPTAIN

Additional LDRD funding has been obtained in FY18 to fully test the SBND Photon Detection System (PDS) this summer in the existing CAPTAIN cryostat, as shown in Figures 1 & 2. The cryostat will be covered by ~150 8-inch phototubes and filled with liquid argon (LAr), and the phototubes will be read-out by the same electronics and DAQ system that will be used in SBND. CAPTAIN will be located near the Lujan neutron source at LANL, so that both beam neutrons and cosmic-ray muons will be reconstructed. Furthermore, it will be possible to test light guide bars from Fermilab in the cryostat. This will constitute a complete test of the PDS.

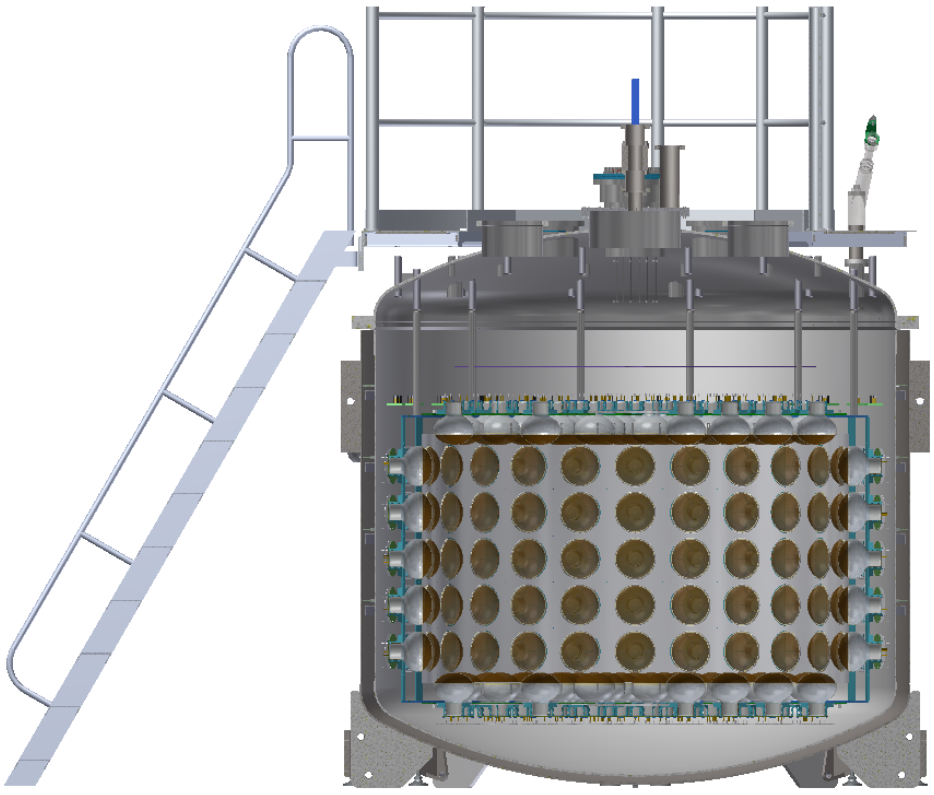

Figure 1: The SBND PDS will be fully tested in the existing CAPTAIN cryostat.

Figure 2: A photograph of the CAPTAIN cryostat in the Lujan neutron beam line.

II. Improved MiniBooNE Beam-Dump Search for Light Dark Matter

MiniBooNE beam-dump data are being used to improve the sensitivity to light dark matter with electron events, neutral-current π^0 events, and timing in addition to

neutral-current elastic events. The dashed blue (black) curve in Figure 3 shows the preliminary sensitivity using electron events (nucleon events) as a function of dark matter mass. The sensitivity is approaching the relic density expectation (green curve).

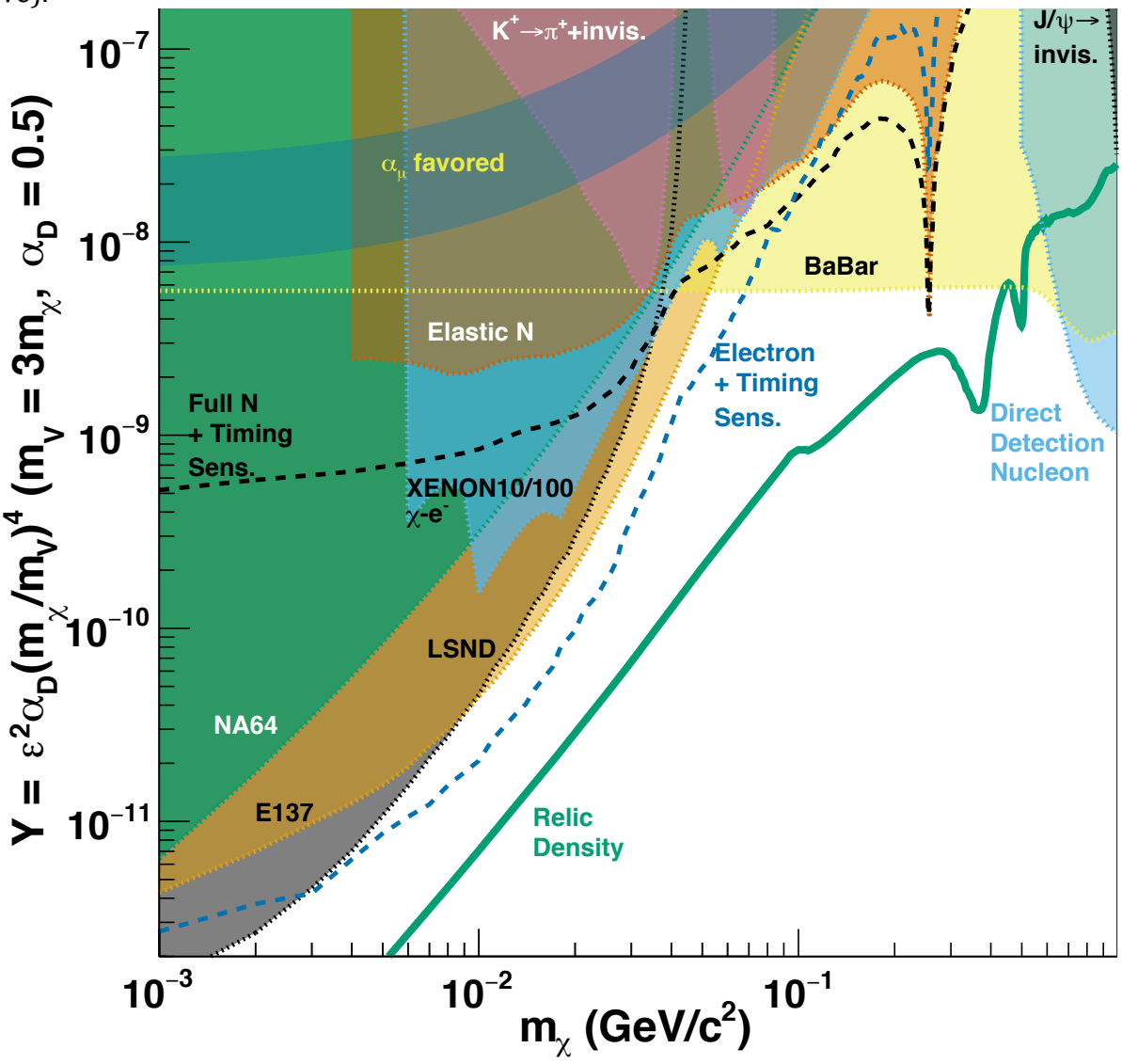

Figure 3: The preliminary sensitivity to light dark matter as a function of dark matter mass, using electron events (dashed blue curve) and nucleon events (dashed black curve). The sensitivity is approaching the relic density expectation (green curve).

III. New MiniBooNE Oscillation Results

New MiniBooNE oscillation results will be presented at the Neutrino 2018 conference with a total of 12.84 x 10^{20} protons on target in neutrino mode, which is approximately double the neutrino data previously reported.